

LETTERS TO THE EDITOR.

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Dr. Watt's Dictionary of the Economic Products of India.

THE notice of this important undertaking in a recent number of NATURE (November 1, p. 4), seems to me somewhat unsympathetic, and scarcely to do justice to its undoubted merits. At any rate, the Government of India, at whose instance the Dictionary was prepared, might draw the conclusion from the review that the work was more open to criticism than I believe to be really the case. A British Government is never too ready to undertake an enterprise of this kind, and anything of the nature of a disappointment, when it has made the experiment, is little likely to induce it to make another.

As I warmly encouraged the inception, and have taken a keen interest in the progress of the Dictionary, I feel bound to express my opinion that it is one of the most important aids which has yet been given to the material advancement of India.

As the reviewer correctly remarks, "the large proportion of the products" of that country "are of vegetable origin." It is, however, astonishing how little they are known in Europe. I can speak with some confidence on this subject, because, in 1880, the India Office transferred to Kew the entire economic-botanical collections forming part of the India Museum at South Kensington. Their incorporation with the existing contents of the Kew Museum was carried out under my supervision. I was struck, as every one has been who has had to do with the subject, with the profusion of products for which some useful purpose ought to be found in the arts. As Kew undertook the duty of acting as referee with regard to these matters, it became necessary to accumulate information with regard to them. I therefore formed in my office a sort of rough dictionary, in which I posted up every paper, document, and scrap of information which I could collect about Indian vegetable products. This enabled me to deal rapidly with a great number of commercial inquiries. But for this purpose, Dr. Watt's Dictionary is an infinitely superior instrument. It is in constant use in my office, and I am at a loss to conceive how the day's work could now be got through without it. As I am continually testing its contents, I can only express my surprise at the degree of accuracy which Dr. Watt has attained. I am quite satisfied that the catalogue of not very important blemishes which the reviewer has managed to detect, must have cost him no small labour. The criticisms, with one exception, I do not propose to discuss. I cannot help, however, regretting that the reviewer both begins and ends his article with something like a sneer—in the one case at the size of the book, in the other at the paper on which it is printed.

Such an encyclopædia of economic products as the Dictionary affords, has long been needed. Indirectly I regard it as one of the outcomes of the Famine Commission, the second part of whose Report was presented to Parliament in 1880. In this Report (p. 175) the Commission point out that "at the root of much of the poverty of the people of India . . . lies the unfortunate circumstance that agriculture forms almost the sole occupation of the mass of the population." "Facilities for obtaining profitable markets for all sorts of produce" is a necessary means of remedying this state of things. But it is obvious that the markets will not come into existence till the products are brought into demand by better knowledge.

The bulk of the book and the length of the articles was, I imagine, the result of a deliberate plan on the part of the Department of Revenue and Agriculture under whose authority the Dictionary was issued. One object in view was to afford to Indian officials, who cannot be expected to take a miscellaneous library about with them, a standard book of reference. The want of something of the kind led Mr. Edwin T. Atkinson, of the Bengal Civil Service, to commence a sort of industrial survey of the north-western provinces. The work is only a fragment, as Dr. Watt's Dictionary has since covered the ground. The preface to the first part (Allahabad, 1876) puts the needs of Indian officials so clearly, that it will be useful to quote from it:

"There is no subject perhaps regarding which so much

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has been written and spoken as 'the development of the resources of the country.' The phrase is a pretentious one, and has a rounded, rolling sound worthy of many of the ideas launched in its name, but really expresses what must form one of the first duties of every civilised Government. As early as June 1804 a Mr. Gott was deputed to examine the forests of Rohilkhand and Gorakhpur, with the view of ascertaining what local products could be advantageously brought to the notice of the European world. . . . He was followed by Laidlay and others, who examined into many of the questions which even now are made the subjects of inquiry. Their reports lie unused and unknown amid the twelve hundred volumes of records composing a portion of the immense library of our Board of Revenue, and surely it would be a saving of money and labour if these reports were given to the official and non-official public. My own inquiries have shown me that it is the tendency of all these questions to crop up in cycles, with the same result, the same perfunctory procedure; and were official memory long enough to recollect what has already been done, and know where to find it, one half of the erratic circulars which now puzzle and worry the district officers, might be answered by a reference to the correspondence on the same subject. . . . A review of the efforts made in the past to attain a knowledge of the resources of the country is not unmixed with regret. They have all gone by without leaving any trace behind them, and without advancing our knowledge one single step, because they wanted organisation."

In criticising Dr. Watt's Dictionary, a statement like this should be borne in mind. Dr. Watt has, in fact, and it is one of the great obligations we owe to him, gutted and boiled down the colossal and inaccessible official literature of India. For the first time, an Indian official has at hand all that is practically to be said about any local product with which he has to deal.

These points were, I think, not clearly brought out in the review in NATURE, and I think it is only due to the Government of India that they should be stated.

There is one detailed criticism on which I absolutely take issue with the reviewer. He devotes some space to the expression of the opinion that with regard to "drugs and therapeutics, the details are out of place in a description of economic products." He particularly objects to the inclusion of plants, "solely because of some medicinal, or supposed medicinal, use, frequently by ignorant people." To me the subject seems, on the contrary, of the deepest importance. It is the empirical knowledge acquired by "ignorant people" which is at the base of almost all our knowledge of drugs. And the extension of modern therapeutics must in the main depend on following up the beginnings in new directions which ignorant people have made. In this respect the Dictionary is a mine of information available for the guidance of future research. In India itself a trustworthy account of the properties of the plants used by the natives for therapeutic or even criminal purposes, must, it seems to me, be of every-day utility.

W. T. THISELTON-DYER.

Royal Gardens, Kew, December 8.

IN your recent review of the above work, attention is drawn to the startling statement that "Diamond dust is known to be a powerful mechanical poison." This statement, occurring as it does in an official work, issued by the Government of India, aroused my amazement when I first had occasion to consult the Dictionary. It occurred to me then, and I still think, that the author would have done better to have quoted the words of Colonel Wilks on the subject ("South of India," vol. ii. p. 197), namely, "Whatever doubts may be entertained of the fact, there is none regarding the belief [by the Mahomedans of Southern India in the power of diamonds as a poison], and the supposed powder of diamonds is kept as a last resource like the sword of the Roman, but I never met with any person, who from his own knowledge could describe its visible effects, &c."

Better still perhaps, instead of giving what, as you have pointed out, is an erroneous account of the celebrated Gaikwar's case, Dr. Watt might have quoted the emphatic words of the Commissioners who tried the Gaikwar, that "Diamond dust according to the best authorities has no injurious effect on the human body" ("Commission Report," p. 223).

With some inconsistency—although Dr. Watt quotes an account of the reputed medicinal qualities of prepared diamond

—he does not follow up the first statement by including it in his list of reputed poisons (vol. vi. p. 309.) It may be added that Dr. Watt's selection of authorities, generally, appears to be somewhat capricious. He does not appear to be acquainted with García de Orta's famous work on Indian drugs, for he gives Linschoten and others credit for observations not originally made by them, but by García, e.g. art. *Manna*.

Again, when writing of ambergris, surely he might have found some more direct source of information regarding a product derived from *whales*, than a work, excellent though it be, which deals properly with the products of the Punjab.

I write as one not wishing to find fault, especially as I recognise the good services done by Dr. Watt, but because I believe such a work so brought out, should be a faithful summary of recorded facts, which, if hitherto only known to comparatively few, should be so stated as not to mislead the many who may have occasion to refer to the Dictionary.

V. BALL.

Science and Art Museum, Dublin, November 19.

Drift-Bottles in the Irish Sea.

IN NATURE for Nov. 8 (p. 35) mention is made of the travels of some drift-bottles in the south seas. It may be of interest to put on record the results so far obtained of the distribution of bottles set free by the Liverpool Marine Biology Committee in order to get further information in regard to those currents in the Irish Sea which would affect small floating bodies. The objects we have had in view are: (1) A purely scientific matter, the source and distribution of the plankton; and (2) the probably utilitarian object of determining the movements of the food of fishes, and so one of the causes of their migrations, and also the drift of the floating ova and embryos of food fishes. The tidal currents of the area in question are to a considerable extent known, and marked on the charts and given in books on "Sailing Directions"; but to these currents have to be added the modifying influence of prevalent winds, and what we want to get at is the resulting average effect. We want to know in what direction an object set floating at any spot will probably be carried at various times of the year in ordinary weather. The surface organisms are such feeble swimmers, if locomotory at all, that any results obtained from small floating bottles may be reasonably enough be regarded as holding good for the plankton.

The form of bottle we have chosen is cheap, buoyant, strong, and well corked. It measures 7.5 cm. in length over all, and 1.8 cm. in diameter. Inside it is placed a printed paper requesting the finder to fill in date and locality, in spaces left for the purpose, and post it back to myself. The papers are numbered, and are folded in the bottle in such a way that the distinguishing numbers can be read through the glass, so as to ensure that the bottles are set free in consecutive order. After the bottle has been corked up, the end is immersed a couple of times in melted paraffin, so as to close up the pores in the cork. None of the papers that have been returned show signs of water having got into the bottles.

As to the distribution, I sent off the first few dozen myself from steamers crossing between Liverpool and the Isle of Man, dropping a bottle over every fifteen or twenty minutes between the Bar and Douglas, and also from a steam-trawler while dredging between Port Erin and Ireland. Mr. A. Holt has had a number of bottles distributed for me from his outward-bound steamers on their course between Liverpool and St. George's Channel, and from the Mull of Galloway round to the Mersey. The Lancashire Sea-Fisheries steamer has set free another series along various lines up and down the Lancashire coast, and finally some have been set free at equal intervals of time during the rise and fall of the tide from the Morecambe Bay Light vessel in the northern part of the district, and from the Liverpool North-west Light vessel in the southern part. The distribution has now been going on since the beginning of October, and a very fair proportion (about one out of every three) of the papers have already been returned to me duly filled in and signed. They have come from various parts of the coast of the Irish Sea—Scotland, England, Wales, Isle of Man, and Ireland. Some of the bottles have gone quite a short distance, having evidently been taken straight ashore by the rising tide. Others have been carried an unexpected length—e.g. one (No. 35) set free near the Crosby Light vessel off Liverpool at 12.30 p.m. on October 1, was picked up at Salt-coats in Ayrshire on November 7, having travelled a distance

of at least 180 miles (probably far more) in 37 days or less; another (H 20), set free near the Skerries, Anglesey, on October 6, was picked up at Ardrossan, Ayrshire, on November 7, having gone at least 150 miles in 31 days.

It would be premature as yet, until many more dozens or hundreds have been distributed and returned, to draw any very definite conclusions. It is only by the evidence of large numbers that the vitiating effect of exceptional circumstances, such as an unusual gale, can be eliminated. However, I may state, as provisional results so far, that nearly fifty per cent. of the bottles found have been carried across to Ireland, and they are chiefly ones that had been set free in the southern part of the district (between Liverpool and Holyhead) and off the Isle of Man. The bottles set free along the Lancashire coast and in Morecambe Bay seem chiefly to have been carried to the south and west—to about Point of Ayre, in North Wales, and Douglas, in Isle of Man. It is apparently only a few that have been carried out of the district through the North Channel. The most interesting point, so far, is that so many of the bottles have been stranded on the Irish coast, although they were sent off for the most part much nearer to the English and Welsh coasts, showing no doubt the influence of the spell of easterly winds in October.

W. A. HERDMAN.

University College, Liverpool, November 29.

The Explosion of Gases in Glass Vessels.

WHEN Prof. Lothar Meyer was visiting Manchester a few years ago (on the occasion of the meeting of the British Association), he surprised me by saying that it was his custom in lecture to explode mixtures of ethylene and other hydrocarbons with oxygen in glass cylinders, some 10 to 12 inches long by 1½ to 2 inches in diameter (if I remember rightly), and that he had never had an accident. I suppose I did not sufficiently conceal my surprise, for he immediately demanded that we should go to the laboratory and repeat the experiment. Not having a mixture of ethylene and oxygen ready, I could not accept the challenge on the spot. The issue was therefore changed. Prof. Lothar Meyer said that he would fire a mixture of hydrogen and oxygen in a thin glass test-tube without breaking it. I confess I was sceptical, until I saw him do it time after time without injury. He argued that if the thin test-tube would withstand the explosion of hydrogen and oxygen, a thick glass cylinder would withstand the more violent explosion of a hydrocarbon. Nevertheless I ventured to warn him against trying the experiment with either acetylene or with cyanogen, the two gases I had found to explode more violently than any others, *especially with a small quantity of oxygen*. Prof. Meyer's recent accident with acetylene and oxygen has led him to warn chemists against the danger of that mixture. I would wish to add to that warning that the danger is equally great, if not greater, with a mixture of cyanogen and oxygen.

Prof. Lothar Meyer asks how we can account for the violence of the explosion of acetylene, when the velocity of its explosion is so little greater than the velocity of explosion of marsh gas and of ethylene, while it is far less than that of hydrogen? It is important to bear in mind that the explosion-wave is not set up at once; when a gaseous mixture is ignited at the open end of a tube the flame starts comparatively slowly. The violence of an explosion in a short tube depends mainly on whether the explosion-wave is set up or not. I think the immunity so long enjoyed by Prof. Meyer's cylinders depends on the fact that the wave was not set up. I have found that pieces of strong combustion tubing, which will stand an hydraulic pressure of twenty-five atmospheres, are broken by the explosion-wave of hydrogen and oxygen. It requires exceptionally strong glass tubes, capable of bearing at least 120 atmospheres, to withstand the shock of the explosion-wave with cyanogen or acetylene. With both these gases it is the incomplete combustion which occurs with the greatest rapidity and violence. According to the hypothesis I have published, viz. that the explosion-wave travels with the velocity of sound in the burning gases, the pressures existing in the explosion-wave of cyanogen and acetylene with their own volume of oxygen are 117 and 105 atmospheres respectively. Quite apart from this hypothesis, the pressures may be calculated from Riemann's equation for the propagation of a wave of constant type, since we know the density of the unburnt gases and the rate of propagation of the wave. According to Riemann's equation the pressure in the cyanogen explosion is 140 atmospheres, and in